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ABSTRACT

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Construct Validity of Four Vocational Interest Factors

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Abstract

Using a rotated varimax solution based on high school juniors, factor scores on the Vocational Interest Inventory were computed for 300 counseling clients. These factor scores were correlated with the 6 General Theme, 23 Basic Interest, and 124 Occupational Scales to the Strong-Campbell Interest Inventory. Based on the strength and direction of the simple and multiple correlations observed, the four factors of Organization vs. Outdoor, Service vs. Technical, Business contact vs. Science, and Artistic vs. Conventional were concluded to underlie interest measures within the RIASEC framework.

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Construct Validity of Four Vocational Interest Factors

The number of dimensions underlying vocational interests and their psychological interpretation remain unsettled. Hanson (1974) in reviewing research in the area cites studies typically yielding from four to seven factors. Achieving consensus would benefit not only the vocational theorist but the applied psychometrician who needs to present test results to clients and counselors in the least complex and most meaningful fashion.

A series of studies based on the Vocational Interest Inventory (VII) which measures Roe's eight groups suggests four interpretable dimensions, three of them bipolar, underpinning the RIASEC framework. A first analysis (Lunneborg, 1977) based on 5,000 high school juniors identified four rotated varimax factors: Organization vs. Outdoor (ORG/OUT), Service vs. Technical (SER/TEC), Business contact vs. Science (BUS/SCI), and ART. Roe's eighth group, General Cultural (CUL), was not well defined, loading slightly more heavily on the Service than on the Organization factor.

Next, factorial studies of the VII and Vocational Preference Inventory based on a college sample yielded from three to five factors (Lunneborg and Lunneborg, 1975). Again, the above four factors appeared, with General Cultural heavily loading on Service. These results challenged the adequacy of a two-dimensional framework, inherent in the circular ordering of RIASEC groups, to represent vocational interests to counseling clients.

Finally, similarly defined dimensions were identified in a discriminant function (DF) study which utilized both the VII and the ACT Interest Inventory: Business contact vs. Science, Business detail vs. Arts, and Service vs. Technical (Lunneborg and Lunneborg, in press). In these analyses the Organization vs. Outdoor and Artistic factors merged, as data for only three DF's were available for the ACTII sample.

The present study sought to further cross-validate the four factors. Would their interpretation be substantiated outside the context of the above-cited tests? By relating scores on these factors to performance on another instrument with the RIASEC orientation, two kinds of evidence can be produced which address the problem of the underlying nature of vocational interests. First, if the factors are generalizable, then their correlations with this new instrument should be predictable, e.g., the Organizational vs. Outdoor factor should be highly correlated with any Conventional scale. Secondly, the four factors together should account for nearly all of the reliable variance on each scale in the new tests. To the extent that these two conditions are met, the four factors would receive support for improving our theoretical understanding of this interest domain.

Method

Subjects. The first 150 vocational counseling clients of each sex to receive the Strong-Campbell Interest Inventory or SCII (Campbell, 1974) at the University of Washington's counseling center (from October 1974 to December 1975) provided the present sample of 300.

Instruments. In addition to the SCII with its Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C) scales clients took the VII providing scores in Roe's eight groups.

Data analysis. The VII rotated varimax solution for the high school sample was used to compute the four factor scores for each subject. These factor scores were then correlated with the six General Theme, 23 Basic Interest, and 124 Occupational scales to the SCII. Multiple correlations were then computed between the set of factor scores and each SCII scale (varimax solution in Table 1).

Results

Table 2 presents simple correlations between the four factors and SCII General Theme scales and the Basic Interest scales belonging to each theme. Note for the SCII that a prediction was made as to the factor which should correlate most highly with the scales, based on the correspondence between the Holland and Roe schemes. In this connection the CUL scales of Writing, Law/Politics, and Teaching were predicted to be most highly related to the SER pole of the SER vs. TEC factor inasmuch as the CUL scale, as previously mentioned, had its highest correlation with this factor (Table 1). Note that the predictions for the R interest group reflect that R contains two Roe groups, Outdoor and Technical. Note also that Roe would make no prediction about Military interests and would assign Athletics to Arts & Entertainment and Domestic Arts to Service.

Table 1

VII Rotated Varimax Solution for 5,000 High School Juniors Tested 1973

(Decimal points omitted)

VII scales	Rotated varimax factors			
	ORG vs. OUT	SER vs. TEC	BUS vs. SCI	ART
SER	-27	73	04	-19
BUS	14	-14	83	-21
ORG	77	-08	19	-24
TEC	-11	-81	03	-07
OUT	-78	-02	-12	-09
SCI	-11	-10	-84	-25
CUL	52	56	-10	07
ART	-06	-05	03	97

Table 2

Correlations of Four VII Factors with VII Scales and SCII General Theme and Basic Interest Scales (Decimal points omitted)

Scale	Factors				Scale	Factors			
	ORG/OUT	SER/TEC	BUS/SCI	ART		ORG/OUT	SER/TEC	BUS/SCI	ART
SER	-14	74	08	-10	A	-00	22	-07	60[a]
BUS	11	-08	80	-12	ART	-04	16	-04	53[a]
ORG	71	-12	22	-19	MUS	05	21	-06	57[a]
TEC	-25	-74	-17	-36	WRI	15	37[a]	-04	49
OUT	-81	-29	-03	-17	S	-07	46[a]	01	05
SCI	-02	-26	-78	-34	ATH	-38	-14	08	-17[a]
CUL	52	65	-14	31	DOM	-02	06[a]	-02	02
ART	-01	16	05	96	REL	-06	24[a]	-02	-00
R	-39[a]	-46[a]	-02	-27	SSV	03	54[a]	03	11
ADV	-39[a]	-30	15	-05	TEA	-03	47[a]	-09	22
AGR	-66[a]	-19	-04	-11	E	16	-11	39[a]	-14
MEC	-23	-46[a]	-11	-21	BUS	24	-01	39[a]	-16
MIL	01	-07	15	-27	LAW	16	22[a]	19	01
NAT	-44[a]	-07	-22	-03	MER	20	-09	40[a]	-04
I	-11	-19	-42[a]	-09	PUB	10	31	25[a]	19
MAT	11	-33	-20[a]	-24	SAL	10	-09	44[a]	-17
MSC	-13	-13	-39[a]	-16	C	35[a]	-23	04	-30
MSV	-08	-03	-36[a]	-25	OFF	40[a]	-01	03	-20
SCI	-10	-31	-48[a]	-17					

[a]Predicted highest factor correlation for each scale

The predictions made for all of the General Themes were confirmed and for all but five of the Basic Interest scales. The Basic Interests which deviated from prediction were Mathematics (more technical than scientific), Writing (more artistic than service), Athletics (more outdoor than arts & entertainment), Domestic Arts (unrelated to any factor), and Public Speaking (more SER than BUS). Although the prediction was confirmed for Law/Politics, note that this scale is not clearly defined. Military Activities likewise is not well defined by these factors as initially conceived, i.e., the negative r with ART will only be interpretable after other results are discussed.

Table 3 presents the factors selected in multiple regression, selection ceasing when R^2 was no longer significantly improved. R^2 for the Themes ranged from a high of .40 for A to a low of .22 for I. These values should be interpreted using the range of between-form reliabilities for General Theme scores reported by Blakeney, Matteson, and Holland (1972). Only 32-52% of the variance of the six SCII Themes was accounted for by the same named scales of the VPI.

Basic Interest scales, because of their method of construction, were anticipated to be the least predictable of SCII scales. Paralleling the results of Table 2 with zero order correlations of factors and scales, Table 3 reveals that the least predictable scales included MIL, MAT, ATH, DOM, LAW, and PUB. Also poorly accounted for were Medical Science, Medical Service, and Religious Activities.

In Table 4 the Occupational scales have been organized according to Roe's eight groups. (Twenty CUL occupations have been combined with the 16 SER occupations because the CUL scale is most highly correlated with the SER vs. TEC factor.) The occupations placed in any given Roe group ought to have their highest correlations with the factor bearing the same name. For ORG occupations, predictions were thus confirmed for 10 of 19 occupations. The confirmed predictions for

the other groups were: OUT, 1/2; SER, 21/36; TEC, 6/8; BUS, 7/7; SCI, 23/36; ART, 10/12.

While the majority of predictions were accurate, there were systematic discrepancies. The nine ORG disconformations all correlated more highly with BUS. For SER 9 of the disconfirmations were among CUL occupations while other missed predictions involved protective and personal service occupations such as Highway Patrol Officer and Flight Attendant which are factorially different from social and guidance service occupations. Missed predictions in the SCI group were principally occupations which correlated more with TEC and negatively with ART such as Math-Science Teacher, Pharmacist, Optometrist.

Table 5 presents the largest factor correlation for each scale, omitting values below |.20|, as well as all other correlations of |.40| and higher. Organizing these scale-factor correlations in terms of the factors thus provides a picture of the occupational structure to each of these dimensions. Factors I and III are the clearest. Certainly Factor I is well typified as Organization vs. Outdoor by the occupational scales having strong positive and negative correlations with it. Likewise Factor III, Business contact vs. Science, is excellently illustrated by Realtor, Salesman, and Buyer vs. Physical Scientist, Physician, and Biologist. The only curiosity is that the three female-normed occupations of Secretary, Flight Attendant, and Army Officer had their strongest correlations with the Business contact pole.

Factor IV, Art, had the expected occupational scales positively correlated with it--Entertainer, Musician, Artist, etc.--and an interesting set of occupations negatively related to it. What do Army Officer, Credit Manager, Farmer, and Instrument Assembler have in common that distinguishes them from artistic occupations? Conventionality and conformity are probably their common denominator.

Table 3

Results of Multiple Correlations between VII Factor Scores and SCII General Theme and Basic Interest Scales

SCII scale	R^2	Factor selected	SCII scale	R^2	Factor selected	SCII scale	R^2	Factor selected
R	20	SER/TEC	MSC	16	BUS/SCI	S	21	SER/TEC
	32	ORG/OUT		18	ORG/OUT		23	ORG/OUT
	33	ART		19	ART		24	ART
ADV	15	ORG/OUT	MSV	13	BUS/SCI	ATH	14	ORG/OUT
	21	SER/TEC		18	ART		15	ART
	23	BUS/SCI		19	ORG/OUT		16	BUS/SCI
	24	ART	SCI	23	BUS/SCI	DOM	00	SER/TEC
AGR	44	ORG/OUT		30	SER/TEC	REL	06	SER/TEC
	45	SER/TEC		31	ORG/OUT		07	ORG/OUT
MEC	21	SER/TEC	A	36	ART	SSV	29	SER/TEC
	24	ORG/OUT		38	BUS/SCI		30	ORG/OUT
MIL	07	ART		39	ORG/OUT	TEA	23	SER/TEC
	11	BUS/SCI		40	SER/TEC		24	BUS/SCI
NAT	19	ORG/OUT	ART	28	ART		26	ORG/OUT
	25	BUS/SCI		29	ORG/OUT		27	ART
	26	ART		30	BUS/SCI	E	15	BUS/SCI
I	18	BUS/SCI		31	SER/TEC		19	ORG/OUT
	20	SER/TEC	MUS	32	ART		23	ART
	22	ORG/OUT		33	BUS/SCI		25	SER/TEC
MAT	11	SER/TEC		34	SER/TEC	BUS	15	BUS/SCI
	13	ORG/OUT	WRI	24	ART		23	ORG/OUT
	16	ART		30	SER/TEC		28	ART
	19	BUS/SCI		31	BUS/SCI			

Table 3 (cont'd)

Results of Multiple Correlations between VII Factor Scores and SCII General Theme and Basic Interest Scales

SCII scale	R^2	Factor selected
LAW	05	SER/TEC
	07	BUS/SCI
	10	ORG/OUT
MER	16	BUS/SCI
	21	ORG/OUT
	24	SER/TEC
PUB	09	SER/TEC
	14	BUS/SCI
	16	ART
SAL	19	BUS/SCI
	24	ART
	26	ORG/OUT
	27	SER/TEC
C	12	ORG/OUT
	25	ART
	30	SER/TEC
	31	BUS/SCI
OFF	16	ORG/OUT
	23	ART
	24	BUS/SCI

Table 4

Correlations of the Four VII Factors with SCII Occupational Scales Organized According to Roe's Scheme

(Decimal points omitted)

Scale	R^2	Factors ORG	SER	BUS		Scale	R^2	Factors ORG	SER	BUS	
		OUT	TEC	SCI	ART			OUT	TEC	SCI	ART
19 ORG						2 OUT					
Per Dir-m	24	23	23	38	05	Farm-m	43	-27	-50	02	-50
Pub Adm-m	26	31	31	31	08	Forest-m	42	-51	-41	-08	-35
AgrBus-m	41	-02	-34	23	-52	36 SER					
Buyer-f	34	33	-08	34	-23	HwpOff-m	46	-32	-45	17	-51
Buyer-m	37	27	01	50	-05	PETea-f	33	-48	-20	02	-37
CrdMgr-m	32	35	04	32	-18	PolOff-m	25	-32	-28	21	-30
DptMgr-m	22	12	-04	41	-11	ColPrf-f	11	-02	-08	-30	09
FunDir-m	26	14	-07	40	-21	ColPrf-m	38	-05	16	-49	29
PurAg-m	41	11	-32	37	-36	LangI-f	18	10	14	-19	35
Acct-f	42	41	-34	15	-23	Psych-f	14	00	09	-27	23
Acct-m	39	39	-18	22	-30	Psych-m	36	08	35	-31	41
Banker-f	51	43	-24	24	-35	SocSci-m	39	15	36	-36	36
Banker-m	45	34	-16	39	-28	EnglT-f	48	23	54	08	54
BusEdT-f	33	36	08	26	-26	EnglT-m	47	06	56	04	52
BusEdT-m	26	30	10	30	-17	LangT-f	45	20	57	10	49
CrdMgr-f	57	37	-21	36	-40	Librar-f	26	33	30	-08	37
DptSales-f	18	23	-06	17	-25	Librar-m	48	39	45	-20	47
ExHkpr-f	14	27	08	08	-17	Reprt-f	42	-11	22	05	61
Sectry-f	26	30	02	35	-11	Reprt-m	33	07	15	20	55

Table 4 (cont'd)

Correlations of the Four VII Factors with SCII Occupational Scales Organized According to Roe's Scheme

(Decimal points omitted)

Scale	R^2	Factors ORG OUT	SER TEC	BUS SCI	ART
ChrEd-f	36	03	58	-00	23
ElemT-f	15	17	35	-08	04
ElemT-m	15	09	38	02	13
Guid-f	37	19	60	01	22
Guid-m	18	11	39	15	02
Minis-m	30	08	51	-04	29
Priest-m	42	11	60	-04	37
RecL-f	22	04	42	24	19
RecL-m	15	-02	27	30	06
SchSup-m	22	17	37	26	01
SSciT-f	32	23	53	15	20
SSciT-m	28	05	43	35	13
SocW-f	30	24	52	-00	16
SocW-m	43	25	62	04	30
YWCA-f	29	06	50	23	24
FlgtAt-f	09	03	07	28	10
HomeT-f	03	05	16	-02	07
Lawyer-f	13	23	20	12	25
Lawyer-m	33	27	50	14	33
Beaut-f	20	-03	-21	30	-26
8 TEC					
InsAss-f	42	01	-46	05	-52
MerMOff-m	45	-34	-56	-08	-42
SkillC-m	49	-25	-62	-05	-45
VocAgT-m	36	-30	-33	06	-51
CompP-f	36	04	-53	-26	-27
CompP-m	26	05	-41	-30	-21
Engr-f	31	-00	-52	-23	-24
Engr-m	30	-15	-48	-25	-27
7 BUS					
ChambCm-m	30	28	29	40	14
CompSal-m	12	12	-01	31	-03
InvFMgr-m	18	26	00	28	19
LifeIns-f	27	22	14	45	04
LifeIns-m	23	07	14	44	-05
Realtor-m	50	11	-18	55	-32
Sales-m	33	15	09	54	-01
36 SCI					
Cartog-m	32	-05	-51	-22	-32
Diet-m	09	15	02	04	-23

Table 4 (cont'd)

Correlations of the Four VII Factors with SCII Occupational Scales Organized According to Roe's Scheme

(Decimal points omitted)

Scale	R^2	Factors ORG OUT	SER TEC	BUS SCI	ART
OccThp-f	20	-22	08	-28	17
RegNur-m	25	-11	04	-43	-20
Vet-m	55	-48	-37	-45	-32
X-Ray-f	33	-18	-35	-39	-36
Biol-m	37	-11	07	-55	12
Chem-f	23	-11	-30	-39	-11
DenHy-f	25	-21	-17	-38	-27
Dentist-f	35	-18	-39	-44	-23
Dentist-m	25	-23	-23	-40	-14
Diet-f	08	03	-13	-23	-17
Math-f	13	-04	-19	-33	-06
Math-m	26	08	-02	-47	15
MathT-f	48	00	-49	-21	-57
MathT-m	34	-17	-34	-46	-23
MedTec-f	47	-12	-40	-43	-42
MedTec-m	34	-06	-27	-50	-30
Optom-f	40	01	-54	-20	-40
Optom-m	24	-02	-25	-38	-30
Pharm-f	41	-03	-46	-43	-36
PhySci-m	28	-00	-11	-52	03
PhyTher-f	30	-23	-21	-44	-26
Physcn-f	27	-21	-24	-43	-08
Physcn-m	35	-21	-15	-53	-07
Physic-f	26	-10	-40	-34	-15
Speech-f	25	04	37	-10	38
Speech-m	45	03	54	-14	45
Vet-f	39	-32	-46	-36	-17
LicNur-m	15	13	27	-20	-08
PhysTher-m	22	-27	-11	-34	-21
RegNurse-f	23	-18	18	-32	-15
Chiro-m	02	-06	06	-06	-08
Pharm-m	18	03	-24	-08	-38
DentAss-f	26	14	-20	-08	-46
LicNur-f	17	00	-01	-31	-29
12 ART					
AdvEx-f	19	12	00	34	25
AdvEx-m	41	05	40	25	55
Arch-m	27	-10	-16	-15	39
Artist-f	19	-18	11	-06	35
Artist-m	42	-16	27	-26	47
ArtT-f	36	-13	21	-02	55
Enter-f	42	-11	22	05	61

Table 4 (cont'd)

Correlations of the Four VII Factors with SCII Occupational Scales Organized According to Roe's Scheme

(Decimal points omitted)

Scale	R^2	Factors ORG OUT	SER TEC	BUS SCI	ART
IntDec-f	33	07	15	20	55
IntDec-m	33	21	40	12	49
Music-f	38	02	29	-05	59
Music-m	48	23	54	08	54
Photo-m	47	06	56	04	52
4 MIL					
AFOff-m	27	-05	-49	-08	-31
ArmyOf-f	09	13	10	25	02
ArmyOf-m	25	06	-21	30	-31
NavyOf-m	16	-04	-35	05	-25

Table 5

Correlations between VII Factor Scores and SCII Occupational Scales

(Decimal points omitted)

Factor I, Organization vs. Outdoor		Factor II, Service vs. Technical	
43	Banker-f	62	Social worker-m
41	Accountant-f	60	Guidance counselor-f
39	Accountant-m		Priest-m
36	Business education teacher-f	58	Christian ed director-f
35	Credit manager-m	57	Language teacher-f
31	Public administrator-m	56	Engl teacher-m
27	Executive housekeeper-f		Photographer-m
		54	Engl teacher-f
			Musician-m
			Speech pathol-m
-32	Police officer-m	53	Soc sci teacher-f
-48	Physical education teacher-f	52	Social worker-f
	Veterinarian-m	51	Minister-m
-51	Forester-m	50	YWCA worker-f
			Lawyer-m
		45	Librarian-m
		43	Soc sci teacher-m
		42	Recreation leader-f
		40	Advertising exec-m
			Interior decorator-m
		39	Guidance counselor-m
		38	Elementary tchr-m
		37	School superintendent-m
		35	Elementary tchr-f
		27	Licensed practical nurse-m
		-35	Navy officer-m
		-40	Physicist-f
			Medical tech-f
		-41	Forester-m
			Computer programmer-m
		-45	Highway patrol-m
		-46	Instrument assembler-f
			Pharmacist-f
			Veterinarian-f
		-48	Engineer-m
		-49	Math science tchr-f
			Air Force officer-m
		-51	Cartographer-m
			Farmer-m
		-52	Engineer-f
		-53	Computer programmer-f
		-54	Optometrist-f
		-56	Merchant Marine off-m
		-62	Skilled crafts-m

Note. For each scale the largest factor correlation is reported together with all other values of |.40| or higher omitting any value below |.20|.

Table 5 (cont'd)

Correlations between VII Factor Scores and SCII Occupational Scales

Factor III, Business contact vs. Science

55 Realtor-m
54 Salesman-m
50 Buyer-m
45 Life insurance sales-f
44 Life insurance sales-m
41 Department store mgr.-m
40 Funeral director-m
Chamber of commerce exec-m
39 Banker-m
38 Personnel dir-m
37 Purchasing agent-m
35 Secretary-f
34 Advertising exec-f
Buyer-f
31 Computer sales-m
30 Recreation leader-m
Beautician-f
Business ed tchr-m
28 Flight attendant-f
Investment fund mgr-m
25 Army officer-f

-23 Dietitian-f
-27 Psychologist-f
-28 Occupational ther-f
-30 College prof-f
-31 Licensed practical nurse-f
-32 Registered nurse-f
-33 Mathematician-f
-34 Physical therapist-m
-38 Optometrist-m
Dental hyg-f
-39 X-ray tech-f
Chemist-f
-40 Dentist-m
-43 Registered nurse-m
Medical tech-f
Physician-f
Pharmacist-f
-44 Physical therapist-f
Dentist-f
-45 Veterinarian-m
-46 Math science tchr-m
-47 Mathematician-m
-49 College prof-m
-50 Medical tech-m
-52 Physical scientist-m
-53 Physician-m
-55 Biologist-m

Factor IV, Art

61 Entertainer-f
Reporter-f
59 Musician-f
55 Reporter-m
Advertising exec-m
Art teacher-f
Interior decorator-f
54 English teacher-f
Musician-m
52 English teacher-m
Photographer-m
49 Interior decorator-m
Language teacher-f
47 Artist-m
Librarian-m
45 Speech pathologist-m
41 Psychologist-m
39 Architect-m
38 Speech pathologist-f
37 Librarian-f
36 Social scientist-m
35 Language interpreter-f
Artist-f
25 Lawyer-f

-23 Dietitian-m
-25 Department store sales-f
-31 Army officer-m
-38 Pharmacist-m
-40 Optometrist-f
Credit manager-f
-42 Merchant Marine officer-m
Medical tech-f
-45 Skilled crafts-m
-46 Dental assistant-f
-50 Farmer-m
-51 Highway patrol-m
Vocational agriculture tehr-m
-52 Instrument assembler-f
Agribusiness mgr-m
-57 Math science tchr-f

Lastly, Factor II, Service vs. Technical, is clear in its negative correlates, the TEC pole being well represented by Engineer, Computer Programmer, Skilled Crafts. The SER pole, consistent with the known correlation between the CUL scale and Factor II, is positively correlated with a mixture of service occupations (Social Worker, Minister, Guidance Counselor) and of general cultural occupations (English Teacher, Lawyer, Librarian). Some occupations in the group next to CUL, Arts & Entertainment, also had high correlations with Factor II, such as Photographer and Musician.

Discussion

Do these results support the notion of four factors underlying vocational interests as conceived by Roe and Holland? The first evidence is the predictable pattern of correlations between the four factors and the General Themes (Table 2). These r's ranged from .60 between A and ART to .35 between C and ORG/OUT. The suggestion, based on the pattern of occupational scales correlated with the four factors (Table 5), that ART is also a bipolar factor which can be interpreted as unconventional vs. conventional explains this lower correlation of C with ORG/OUT. As is the case with R, the C Theme seems to be represented by two factors or occupational groups. Roe's Organizational group and Holland's C group contain occupations some of which contrast with Outdoor occupations and others of which contrast with unconventional/artistic occupations.

The next evidence in favor of the basic character of the four factors may be found in Table 4 where the majority of occupations correlated as predicted. The 19 ORG occupations were the least predictable. All of the errors, however, involved occupations more highly correlated with Business contact, the group next to ORG. Such occupations apparently have as much to do with persuasion and salesmanship as they do with administration, e.g., Personnel Director and Department Store Manager. Interestingly, for the four ORG occupations normed on both

sexes (Buyer, Accountant, Banker, Business Education Teacher), the male-normed scale always had a higher correlation with Business contact and a lower correlation with Organization than the female-normed scale. The same phenomenon held for another set of misclassification, those SCI occupations which were more highly correlated with TEC than SCI. Here, for SCI occupations normed on both sexes, the male-normed scale had a higher correlation with Science and a lower correlation with Technical than the female-normed scale.

Another aspect to Table 4 which supports the validity of the four factors is their higher $\underline{R}^2$ values with the occupational scales than with the basic interest scales of Table 3. Both Roe and Holland's schemes are occupationally based, classifying all jobs into one of several types. Occupations, therefore, should correlate more highly with measures of these types than would scales measuring basic activity (public speaking or domestic arts) which is found to some degree in several groups.

Lastly, support of the four factors is provided in the regrouping of the data of Table 4 into Table 5 where the larger scale-factor correlations have been organized about the factors. The poles which are best defined, both rationally and most strongly, are both ends of Factor I, ORG and OUT, both ends of Factor III, BUS and SCI, the TEC or negative pole to Factor II, and the ART or positive pole to Factor IV. The SER or positive pole to Factor II was necessarily "contaminated" by general cultural occupations which have a strong, real service component. Finally, as noted above, a negative pole to Factor IV was revealed, consisting of an interpretable set of occupations which are contrary to ART by their very conventional, law-abiding nature.

Independent support for these four spanning all occupations (in addition to representing the more simple types or groups of interests) can be found in the Worker Trait scheme of the Dictionary of Occupational Titles system where

interests are conceived as five bipolar factors that include 4 vs. 9 (Service vs. Technical), 3 vs. 8 (Artistic vs. Conventional), and 2 vs. 7 (Business contact vs. Science). Of the remaining two DOT factors, 5 vs. 0 is outside the interest domain, dealing with rewards from work, while Factor I vs. 6 contrasts things with people, similar to 4 vs. 9, but also contrasts things with ideas. Where is Outdoor interest in the DOT conceptualization? It is both in factors 1 and 9, undifferentiated from Technical.

As stated at the outset these results have practical and theoretical significance. The practical implication is that since four bipolar dimensions span the domain of vocational interests, individual scores on the four factors might prove more meaningful than two, six, or eight scale scores. A counselee can be typified as occupying a position somewhere between Organizational (indoor) and Outdoor, between Service (people) and Technical (things), between Business contact (persuasive) and Science (ideas), and between Artistic (unconventional, abstract) and Conventional (orderly, concrete) in interests.

For the vocational theorist it remains to be seen if it is possible to further clarify the distinction between those occupations which cluster opposite Outdoor and those which cluster opposite Artistic. Similarly, Roe's postulated General Cultural group might be more properly absorbed into its various other components--service, business contact, arts & entertainment--for while teachers, lawyers, librarians, and writers all transmit ideas and knowledge to other people, they are also interested in either serving, persuading, or entertaining others. The question of a pure general cultural group remains.

References

Blakeney, R. N., Matteson, M. T., and Holland, T. A. A research note on the new SVIB Holland Scales. Journal of Vocational Behavior, 1972, 2, 239-243.

Campbell, D. P. Manual for the Strong-Campbell Interest Inventory. Stanford, CA: Stanford University Press, 1974.

Hanson, G. R. Assessing the career interests of college youth: summary of research and applications. ACT Research Report No. 67. Iowa City, Iowa: The American College Testing Program, 1974.

Lunneborg, C. E., and Lunneborg, P. W. Factor structure of the vocational interest models of Roe and Holland. Journal of Vocational Behavior, 1975, 7, 313-326.

Lunneborg, C. E., and Lunneborg, P. W. Is there room for a third dimension in vocational interest differentiation? Journal of Vocational Behavior, in press.

Lunneborg, P. W. Manual for the Vocational Interest Inventory. Seattle: University of Washington, Educational Assessment Center, 1977.

U. S. Government Printing Office. Dictionary of occupational titles (Vol. II) Washington, D. C.: 1965.